U. S. DEPARTMENT OF AGRICULTURE
Forest Service

FOREST PEST LEAFLET 15
May 1957

Pine Reproduction Weevil

By Ralph C. Hall, entomologist, California Forest and Range Experiment Station [1]

The pine reproduction weevil (*Cylindrocopturus eatoni* Buch.) is a native insect of California. First described as a separate species in 1940, this insect is attracting increased attention as a threat to forests of young pine.

The weevil is a killer of juvenile trees. It attacks mostly trees from 18 inches to 3 feet in height but occasionally has been found attacking planted trees up to 10 feet in height. Probably always responsible for a certain amount of loss in natural reproduction, the pine reproduction weevil escaped notice until recently because of the inconspicuous nature of its work. It was first found causing economic damage in 1939 in young ponderosa pine and Jeffrey pine that had been planted in a large brushfield in northern California.

Since then, this insect has been responsible for almost complete destruction of a 3,000-acre plantation of ponderosa and Jeffrey pines in the Big Springs area of the Lassen National Forest. It has caused serious damage in several other similar plantings in northern California and considerable damage to plantings of pines and their hybrids at the Institute of Forest Genetics, a branch of the California Forest and Range Experiment Station at Placerville, Calif. The weevil also has caused serious damage to natural reproduction on burned areas and along roadsides in California (fig. 1).

The recorded range of the pine reproduction weevil is Madera, Mariposa, Eldorado, Plumas, Lassen, Shasta, Modoc, and Siskiyou Counties in California. It is suspected that this weevil occurs in other parts of California, and it may also occur in Oregon.

Hosts

Under natural forest conditions only ponderosa and Jeffrey pines are attacked and killed by this native insect. Under planted conditions at the Institute several species of pines and their hybrids have been attacked and killed, including the Rocky Mountain variety of ponderosa pine, loblolly, Scotch, and Swiss mountain pines, and the hybrids of pitch × loblolly, shortleaf × pitch, western white × eastern white, and Jeffrey × Coulter pines.

Evidence of Infestation

Weevil activity is first seen in the spring, when feeding adults puncture the needles of young trees. The punctures appear as concentric brown rings about 1 millimeter in diameter (fig. 2). Later, feeding takes place on young stems and twigs, where drops of pitch form around feeding punctures and niches where eggs are deposited. Pitch drops are caused by the rupturing of the resin vessels in the outer cortex. Heavy feeding by adults on the needles and young twigs may cause the foliage to turn brown but seldom results in death. The work of this insect can also be detected by cutting into the bark and wood to expose the feedings of the larvae in the cambium region of the stem and twigs.

Cambium feeding usually causes death of the tree. The first indication of injury appears in the late summer when the infested trees begin to turn brown. Death of the foliage usually progresses from the top downward, and by about November 1 most of the needles are red. In a light attack, the infested trees may not fade until the next spring.

[1] Maintained by the Forest Service at Berkeley, Calif., in cooperation with the University of California.

416280°—57

F-481408

Figure 1.—Natural reproduction of ponderosa pine killed by the pine reproduction weevil on a burn on the Sierra National Forest.

After the adult weevils emerge, the tree will be perforated with holes about one-sixteenth of an inch in diameter, giving the bark a shothole appearance. Another evidence of attack is the staining of the infested portion by a blue-staining fungus associated with weevil attack.

Stages of Development

The adult weevil is a small, compact, active insect about 2.6 mm. long by 1.1 mm. wide, clothed with dark and light scales, which give it a grey appearance (fig. 3). A prominent feature is its long, black, curved beak, typical of the weevil family. The eggs are minute, pear shaped, and translucent, and barely visible to the naked eye when first deposited. Later the eggs become white. They are often confused with drops of pitch, which they resemble very closely. The larvae are small, cream-colored, legless grubs, about 4 mm. in length when fully mature. The pupae are also cream colored and about 3 mm. in length.

Life History and Habits

Adult weevils start to emerge from the infested trees about the last week in May and continue until about mid-July. Shortly after emergence the adults start feeding on the pine foliage, twigs, and stems. Mating takes place at this time. Prior to egg-laying a period of about 2 to 3 weeks is spent in feeding.

The adults are very active. They are strong flyers and spend much of their time moving about rapidly on the needles and twigs. When disturbed, they often hop and for that reason may easily be mistaken for leafhoppers.

After the 2-week feeding interval, the females excavate egg niches in the outer bark of the main stem and twigs and deposit a single egg in each niche in the cortical tissue of the tree. The eggs hatch in about 2 weeks, and the small larvae then chew through the inner bark to the cambium where they continue their feeding until maturity.

As the larvae mature, their tunnels cross and run together, with the result that eventually the entire area between the wood and the outer bark is completely destroyed. Larvae reach full development in late fall. When mature, they construct tunnels in the outer layers of the wood in the larger twigs and stems. In the smaller twigs the mature

F-481407

Figure 2.—Feeding punctures by the adult weevil on the needles of Jeffrey pine.

larvae usually mine into the pith. These mature larvae spend the winter at the end of these tunnels in a specially constructed cell. Late in the next spring, larvae transform to pupae, in which stage they spend about 2 weeks. They then transform to adults and emerge, thereby completing their 1-year life cycle (fig. 4).

Natural Control

Several parasitic and predaceous enemies attack the pine reproduction weevil, but they seem incapable of successfully keeping it in check. Indications are that available soil moisture is an important factor in regulating the abundance or scarcity of this insect. Many serious weevil epidemics in planted areas have been associated with years when soil moisture has been deficient during the spring of the year preceding outbreaks. Intense competition with brush

F-481406

Figure 3.—Adult weevil feeding on a ponderosa pine needle (x17).

cover for moisture apparently is associated with intensity of damage.

In uneven-aged pine stands the damage caused by the weevil is seldom important, since only occasional small trees are killed. The weevil apparently avoids areas where the young trees are shaded by older ones in the stand. Epidemic infestations of the weevil have been found only where reproduction occurs in dense, even-aged, young natural stands on exposed sites, or in planted areas where competition is extreme.

Since the eggs are deposited only in the cortical tissue, the thick bark of old trees may account for the fact that only young trees are attacked.

Applied Control

One of the most promising methods of indirect control seems to lie in the plant-breeding field. A hybrid between Jeffrey and Coulter pines developed at the Institute of Forest Genetics has shown great promise in resistance to weevil attack and injury. In 1945 the hybrid was interplanted with its Jeffrey pine parent for field tests in northern California. After 8 years, on the average only 1 hybrid has been killed by the weevil for every 7 Jeffrey pine parents killed.

Direct control is also possible in large planted areas. Aerial application of DDT is recommended. The spray solution per acre should consist of 1 pound of DDT dissolved in 1 quart of an auxiliary solvent plus enough diesel oil to make 1 gallon of solution. The spray should be applied about 50 feet above the brush level. Materials and application cost

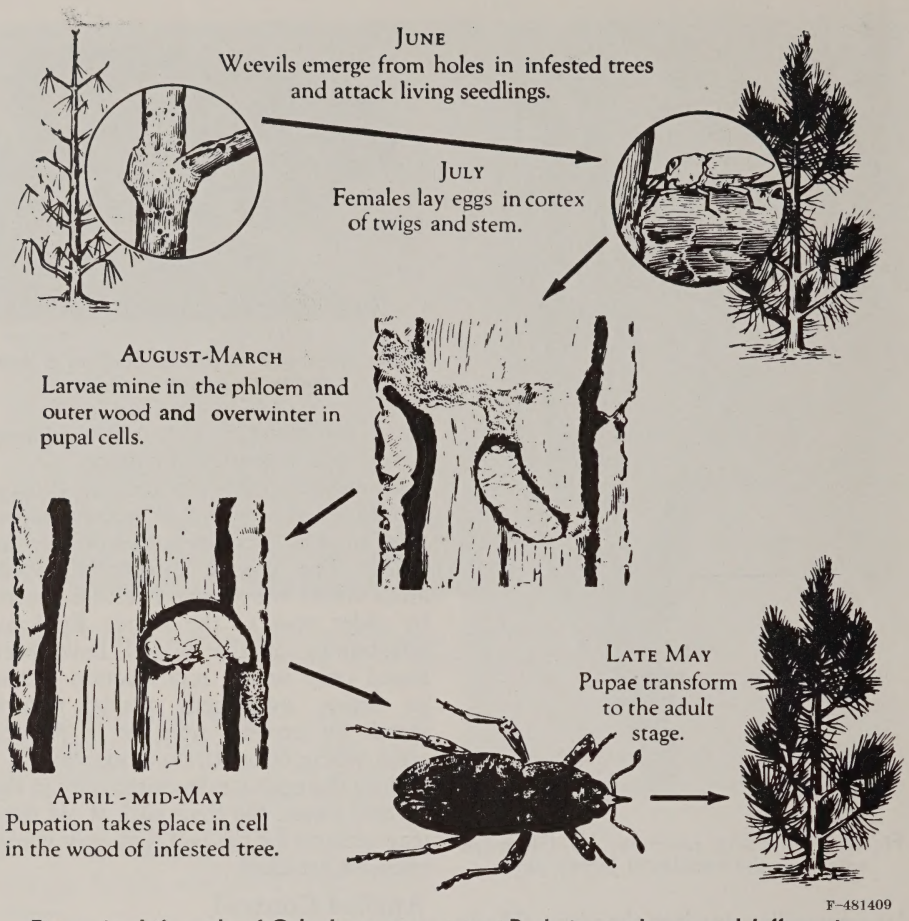

Figure 4.—Life cycle of *Cylindrocopturus eatoni* Buch. in ponderosa and Jeffrey pine.

about $1.25 per acre at 1955 prices. The control objectives are, first, to kill through contact as many adult weevils as possible before egg laying; and second, to kill the subsequent emerging adults through residual action of DDT. Timing is important. The spray should be applied about 3 weeks after the first adult insects emerge.

To protect ornamental trees and small plantations, DDT can also be applied by hand, using a mist-type sprayer. Also, the weevil population in infested trees in small plantings can be destroyed by digging and burning all infested trees before the adults emerge.

CAUTION: DDT is poisonous. Store it in a plainly labeled container away from all food products. In handling this chemical follow directions and heed precautions given on the container. In forest spraying, avoid overdosing, especially in the vicinity of streams and over ponds and lakes.

References

BIOLOGY OF THE WEEVIL *Cylindrocopturus eatoni* BUCHANAN, INJURIOUS TO PONDEROSA AND JEFFREY PINE REPRODUCTION. C. B. EATON. Jour. Econ. Ent. 35: 20–25, illus. 1942.

RESISTANCE OF PINE HYBRIDS TO THE PINE REPRODUCTION WEEVIL. J. M. MILLER. U. S. Forest Service, Calif. Forest and Range Expt. Sta. Res. Note 68, 17 pp., illus. 1950. [Processed.]

U. S. Government Printing Office: 1957

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C. — Price 5 cents